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| DOC. NO.    | 129    |
| TOTAL PAGES | 16     |
| COPY        | 1 OF 2 |

Cost Estimate

for  
25X1A

"Project"

Document # 111

February 10, 1960

25X1A

Prepared by:

Revl

25X1A

The changes in estimated costs are essentially the reflection of seven considerations. These are:

1. Optical Fabrication

Our manufacturing facility has produced a detailed cost estimate for the 18 f/3.8 Baker Schmidt system. This estimate may be considered as much more accurate than the previous one reported in Document #84 in that the earlier one was based on only qualitative descriptions of possible systems of a variety of over all sizes.

2. Window Materials

This cost estimate reflects the possibility of a satisfactory window consisting of only a single piece of quartz. While experiments are now in progress to establish what will be acceptable the facts are not yet known. We here propose that if it proves necessary to provide a more complex window this will constitute a change in scope.

3. Spares

This proposal includes the costs of all engineering, fabrication, component tests, assembly tests and system tests in plant, in test vehicles and in the article.

It does not include more spares than are now estimated as required for the flight test program nor does it include any support of flight operations after engineering tests are complete.

4. Maintenance and Overhaul (In-Plant)

In-plant maintenance and overhaul will be confined to support of systems during their flight test phase, prior to customer acceptance. There is no consideration for maintenance and

overhaul or product improvement as part of "operational" support.

25X1A

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This has resulted in a reduction of estimated costs.

5. Flight Test Program (Site)

The flight test program will be confined to support of systems during their flight test phase, prior to customer acceptance.

There is no consideration for "operational" support at the site.

This has resulted in a reduction of estimated costs.

6. Reliability

Re-estimates from sub-contractors regarding a parallel v/h sensor program and vibration consulting services, coupled with the assumption that certain "test-bed" facilities will be customer furnished, has resulted in a reduction of estimated costs.

7. Costs

Continued engineering establishes the requirement for more accurate gyros for stabilization. This has resulted in an increase of estimated costs for this area.

This cost estimate is divided into six sections, as follows:

1. Prototype
2. Field Support Equipment
3. Spare Parts
4. Flight Test Program
5. Five Additional Systems (2-6)
6. Nine Additional Systems (2-10)

EXHIBIT "A"

~~Attachment I~~

STATEMENT OF WORK

1. Study and Preliminary Design

- 1.1 A study program will be performed as a continuation of the objectives designated under prior Contract No. OM 5400 and as outlined in Document No. 68 dated October 20, 1959.

Primary objective of this program will be extensive study and evaluation of all feasible systems in an effort to determine the optimum system. Acceptance of the contractor's recommendation of the optimum system will constitute approval to proceed in the final design of the system configuration.

- 1.2 Final design effort will proceed pending this approval. If written approval or disapproval is not received within fifteen (15) days after submission, approval will be considered as granted. In this case formal written approval must be furnished by the customer within forty-five (45) days after submission of the above recommendation.

- 1.3 The effort described in paragraph 1.1 above has been completed with the submission of Section 1. of Document No. 119 and the Contractor's recommendation of the "T" system.

- 1.4 Delivery - March 4, 1960

2. Final Design

- 2.1 Design layout drawings of a prototype system will be prepared in accordance with the objectives approved under item 1, in sufficient detail to indicate the overall configuration of the system, and the critical dimensions for mounting and operation.

These drawings will be submitted to the Customer for approval prior to final detailing of all parts or release of final details to manufacturing facilities.

2.2 Detailing and release of detail parts for manufacture will proceed pending this approval. If written approval or disapproval is not received within fifteen (15) days after submission, approval will be considered granted. In this case, formal written approval must be furnished by the customer within forty-five (45) days after submission of the above design layout drawings.

2.3 Delivery - May 15, 1960

2.4 One set of blueprints of the drawings used by the contractor in the manufacture of the systems will be furnished on request at any time after delivery of the last system.

### 3. One (1) Prototype System

3.1 A prototype system will be fabricated in accordance with the design approved under item 2 and in accordance with the design and performance objectives outlined in Section 1. of Document 119 above.

3.2 Delivery of the prototype system will be made to the Test Site indicated by the Customer no later than September 1, 1961. Purpose of delivery to the Test Site will be Test for Customer acceptance of the system.

### 4. Five (5) Additional Systems

4.1 Five (5) additional units of the prototype system will be fabricated in accordance with the design approved under item 2 and in accordance with the design and performance objectives outlined in Section 1. of Document No. 119, above. Incorporation of modifications or devices other than <sup>those</sup> ~~are~~ required in conformance

with the design and performance objectives outlined in Section 1. of Document #119 will be considered above the scope of the contract and subject to negotiation.

4.2 Delivery of the five (5) additional units of the prototype system will be made to a Test Site within a seven (7) months period following delivery of the prototype system (item 3).

5. Acceptance Tests

5.1 Acceptance by the Customer of each system will be contingent upon successful tests of the system in the vehicle. Acceptance Tests will be conducted by the Contractor in conjunction with and utilizing facilities provided by the Customer. Initiation of and successful completion of Acceptance Tests will be contingent upon the availability of all Customer furnished equipment or facilities necessary to evaluate the system for the performance characteristics as outlined in Section 1. of Document #119 above.

5.2 Completion of Acceptance Tests for the prototype system (item 3) should be no later than six (6) months after delivery of the system provided that all Customer furnished equipment and facilities required have been continuously available to permit an average acceptance test rate of three (3) tests per week. Written final acceptance of the prototype will be furnished by the customer within seven (7) days after satisfactory Acceptance Tests have been completed.

5.3 Completion of Acceptance Tests for the five (5) additional units (item 4) should be no later than four (4) months after delivery of the final unit provided that all Customer furnished equipment



or facilities have been continuously available to permit an average acceptance test rate of three (3) tests per week. Written final acceptance of each unit of item 4 will be furnished by the customer within seven (7) days after each units satisfactory acceptance test is completed.

5.4 In the event the facilities as stated in paragraph 5.2 and 5.3 above are not available negotiations for a contract amendment will be considered.

#### 6. Field Support Equipment

6.1 Field Support Equipment will be fabricated or purchased suitable for test and service of system operation in conjunction with acceptance tests at a single field location. The types of equipment to be provided are listed on Attachment "B".

6.2 Field Support Equipment will be delivered with the prototype system, item 3.

#### 7. Spare Parts for Support of Acceptance Tests

7.1 Spare parts will be provided sufficient to support each system in the field for the duration of its Acceptance Test program as described in item 5 above.

*Spares to be provided under a contract 11/7/61*

#### 8. Instruction Manuals

8.1 The contractor shall provide labor, materials, supplies and services necessary to prepare the following manuals.

1. General System Manual
2. Individual Instruction Manuals for each of the following:
  - a. Optical System
  - b. Windows
  - c. Stabilization Equipment
  - d. Film Transport Mechanism

8.2 The General System Manual will be similar to those supplied under contract #HF-20-80. It shall present a general understanding of the overall system and its function. Half-tone line drawings and other necessary illustrations shall be included.

8.3 Individual Instruction Manuals shall be loose leaf manuals similar to those supplied under contract #HF-20-80. Each manual shall present sufficient instructions to permit a factory trained technician to perform general and special maintenance of the equipment in the field.

8.3.1 The Instruction Manual for the Optical System shall each be devoted to this system alone.

8.3.2 The Instruction Manual for the windows shall be devoted to the windows and their mountings alone.

8.3.3 The Instruction Manual for the Stabilization Equipment shall include the following:

Pointing Reference

Vibration Isolation

Caging Mechanism

and directly related equipment.

8.3.4 The Instruction Manual for the film transport mechanism shall be devoted to that mechanism alone.

8.3.5 The Instruction Manual for the Electronic Systems shall cover the following:

Operator Control

Data

V/H Sensor

Exposure Control

Power Supply

and directly related equipment

- 8.4 Delivery of the General System Manual shall be three months after assembly of the first prototype instrument.
- 8.5 Delivery of the first preliminary Instruction Manuals shall be made at the time of shipment of the first prototype from the contractor's plant to the customer's test site.

ATTACHMENT "B"

FIELD SUPPORT EQUIPMENT FOR SIX (6) SYSTEMS

Collimator with six (6) large flats to permit observation of oblique positions.

Tools, meters, etc.

Elec.-mech. check-out consoles:

Configuration

Window

Hatch

Pilot control

Film viewing table and microscope

Film rewinds

Dollies, Lifts, Hoists, Stands

Desiccation Equipment

Power Cart

Cabinets, Benches, Vacuum Cleaner, Office Equipment

Special Clothing

Flight Test Instrumentation

Photographic Equipment and Supplies

Optical Test Apparatus

Strength Tester

Vacuum Tester

Cycle Tester

encl. #1  
-DPD  
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COPY 1 OF 2

ATTACH. IV

PROPOSAL

FOR

25X1A

"PROJECT

Document No. 119  
113

25X1A March 2, 1960

Prepared by:

Reviewed by:

25X1A

Administration

## INTRODUCTION

This Document proposes a system for photographic reconnaissance, and presents a cost estimate for a program to provide six such systems, with certain supporting equipment and activities.

The Document is divided into four sections, as follows:

Section 1 - System Description and Performance Objectives.

Section 2 - Statement of Work

Section 3 - Program Description

Section 4 - Cost Estimate

SECTION 1

SYSTEM DESCRIPTION AND PERFORMANCE OBJECTIVES

PERFORMANCE OBJECTIVES

Performance

Coverage

SYSTEM DESCRIPTION

Optical System

Exposure

Film

Film Velocity

System Weight

Image Motion Compensation

Stabilization

System Control

### SYSTEM DESCRIPTION AND PERFORMANCE OBJECTIVES

The system here proposed, a high acuity photographic device, will obtain detailed intelligence information by large area panoramic reconnaissance coverage.

#### PERFORMANCE OBJECTIVES

##### PERFORMANCE

Laboratory resolution (lens and film) of 250 cycles/millimeter on high contrast target. Operational resolution of at least 105 cycles/millimeter for high contrast targets, and up to 200 cycles/millimeter if atmospheric seeing and V/H sensing permit. See Figures 1 and 2.

##### COVERAGE

1750 frames (28.3" x 6.4") giving 2500 nautical miles continuous longitudinal coverage, 134° total transverse coverage (60 miles), with full stereo.

#### SYSTEM DESCRIPTION (See Figures 3 and 4)

##### OPTICAL SYSTEM

The optical system will consist of two (2) 18" f/3.8 catadioptric systems, 3.5" x 5.4" aperture, and two (2) four sided scanning mirror assemblies.

##### EXPOSURE

Exposure will be f/3.8 effective. A programmed exposure control will be provided, and it will adjust slit width for changes in solar altitude as a function of time and latitude. Nominal maximum slit width is 0.150 inches, based on a maximum possible exposure of 1/75 second. T/8 (est.) based on inclusion of two gold coats in window and #12 Wratten (or equivalent minus blue) filter.

##### FILM

Film capacity will include one (1) Cassette 32" diameter by



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9

1.0

Figure 1

TRANSFER CURVES

(h)  
0.1

LENS FILM ONLY  
(LAS PERFORMANCE)

1 SEC. SHUTTER  
1/10 V/S, 1/75  
SEC. EXPOSURE  
0.001 VIBRATION

Worst  
Possible

Best  
Possible

1/2 SEC. SHUTTER  
1/10 V/S, 1/110 SEC. EXPOSURE  
NO VIBRATION

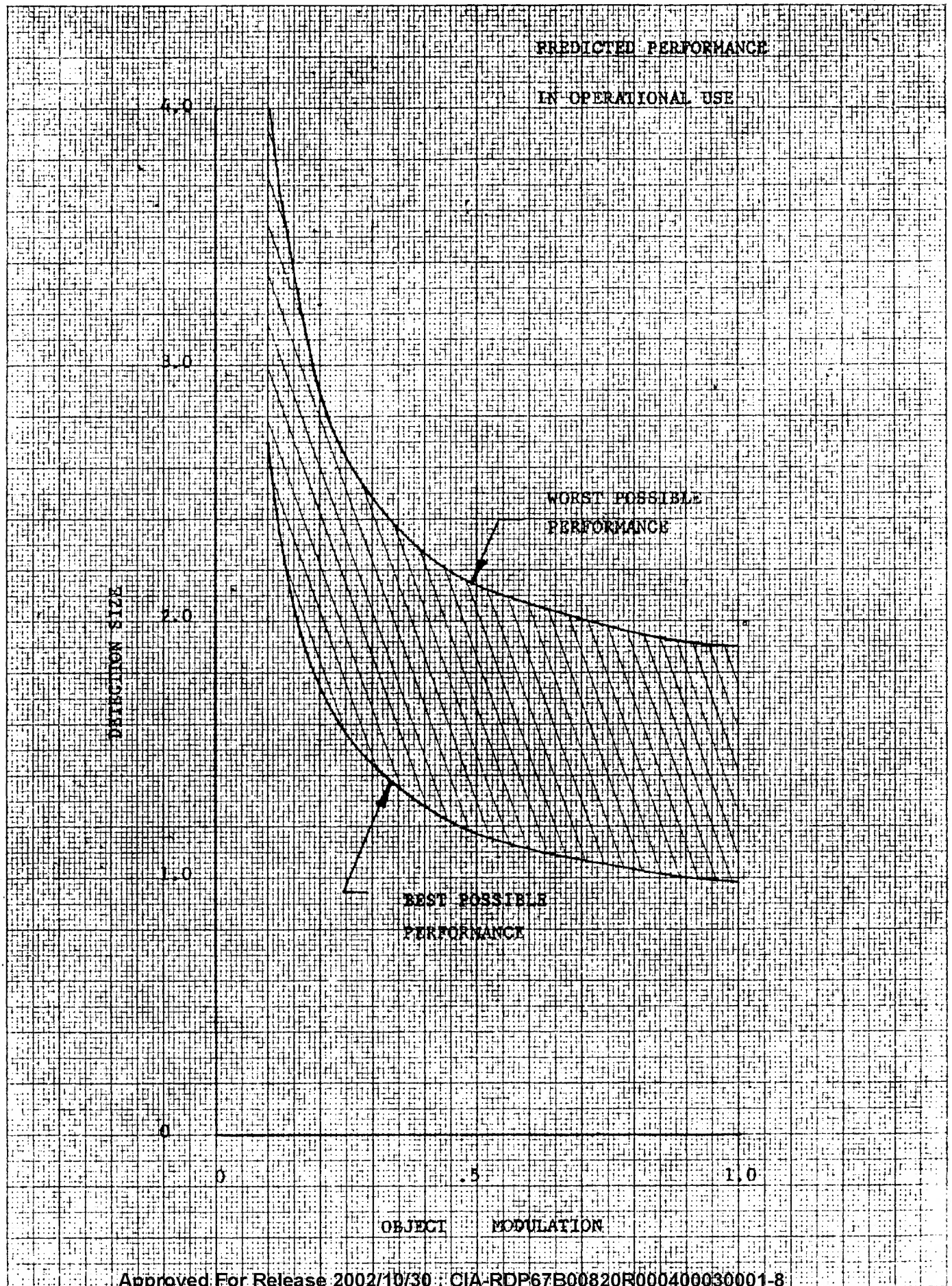
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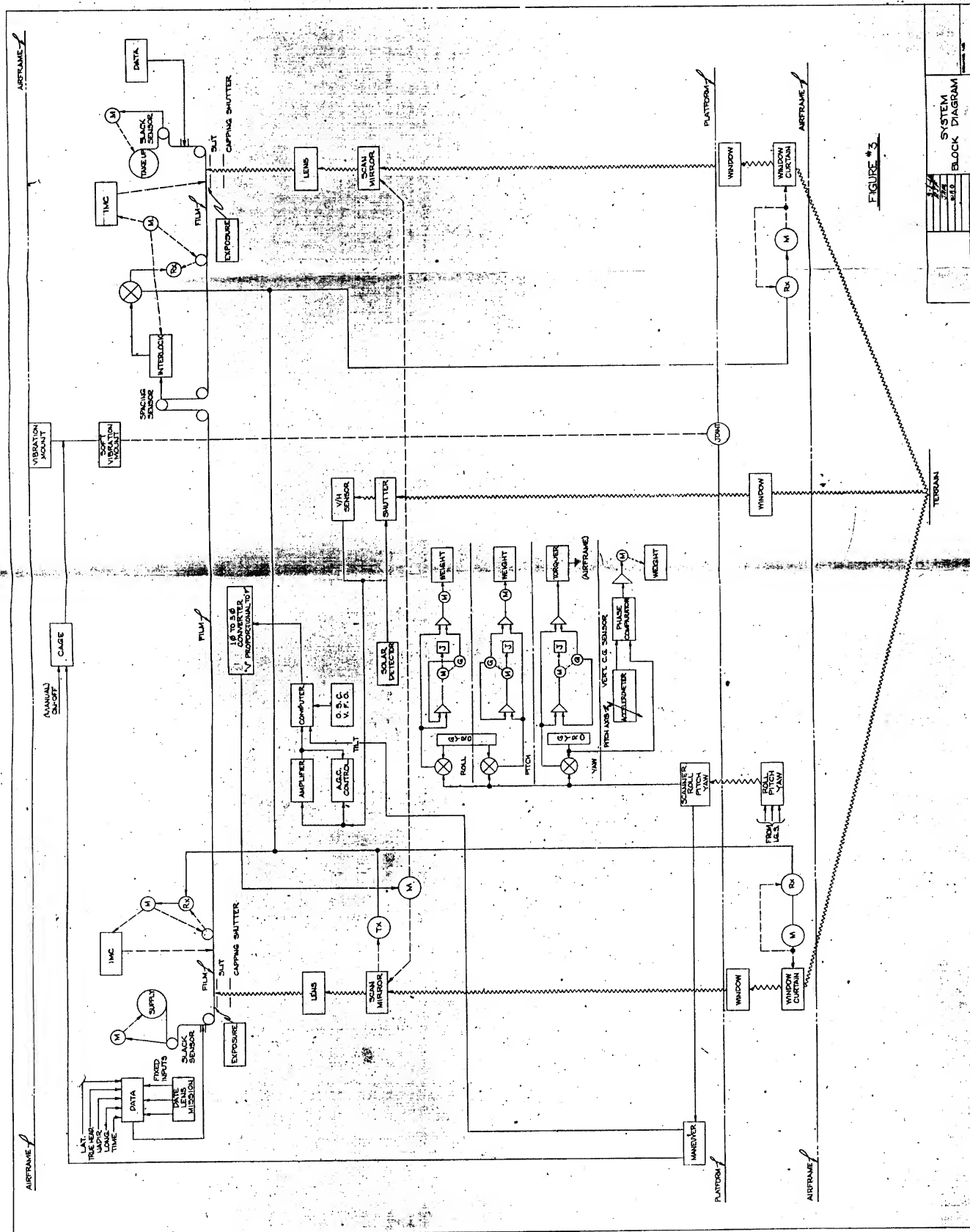
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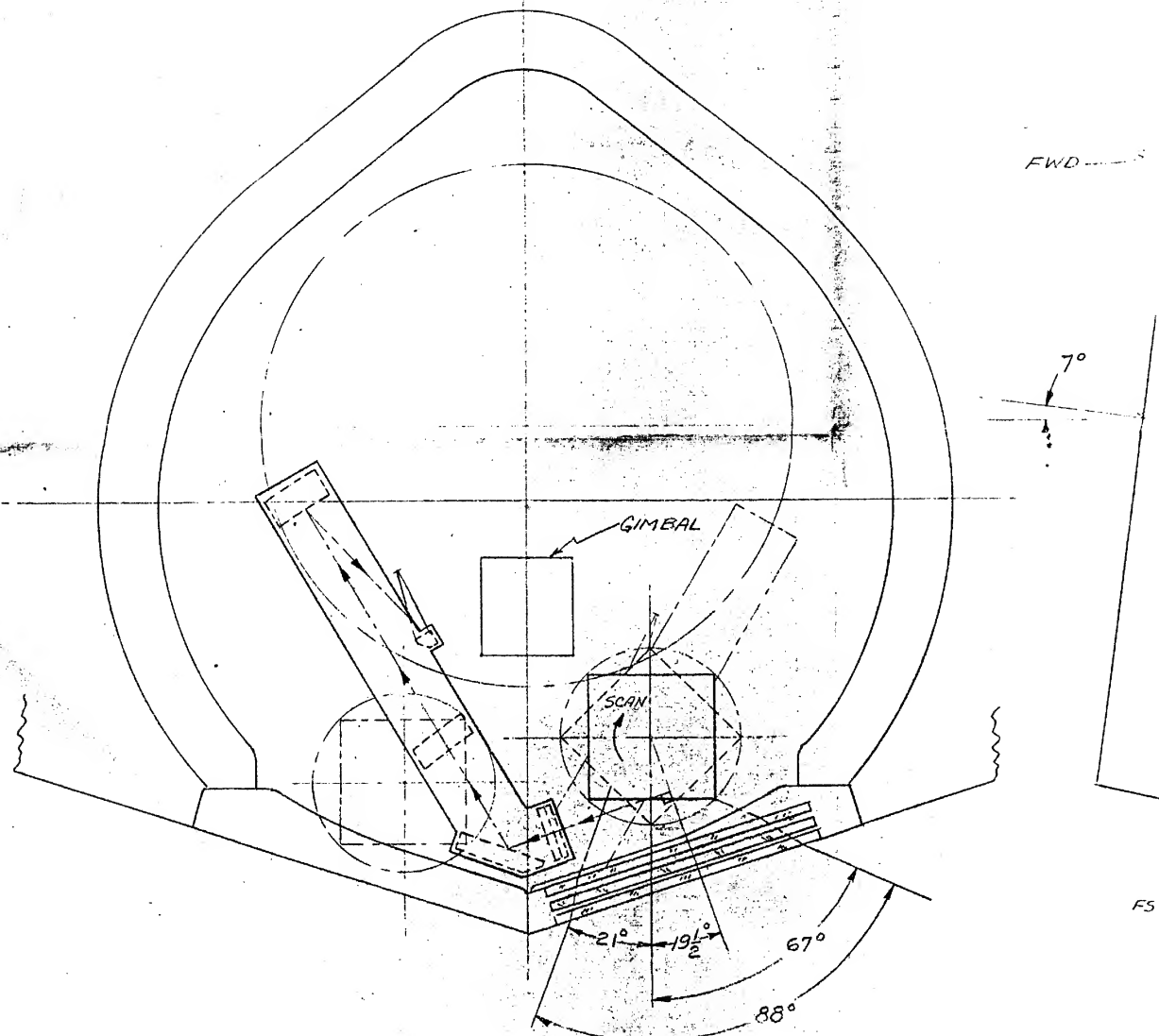
the system will automatically cage, but otherwise continue to operate,  
and will resume normal operation when normal flight attitude is resumed.



TOP VIEW

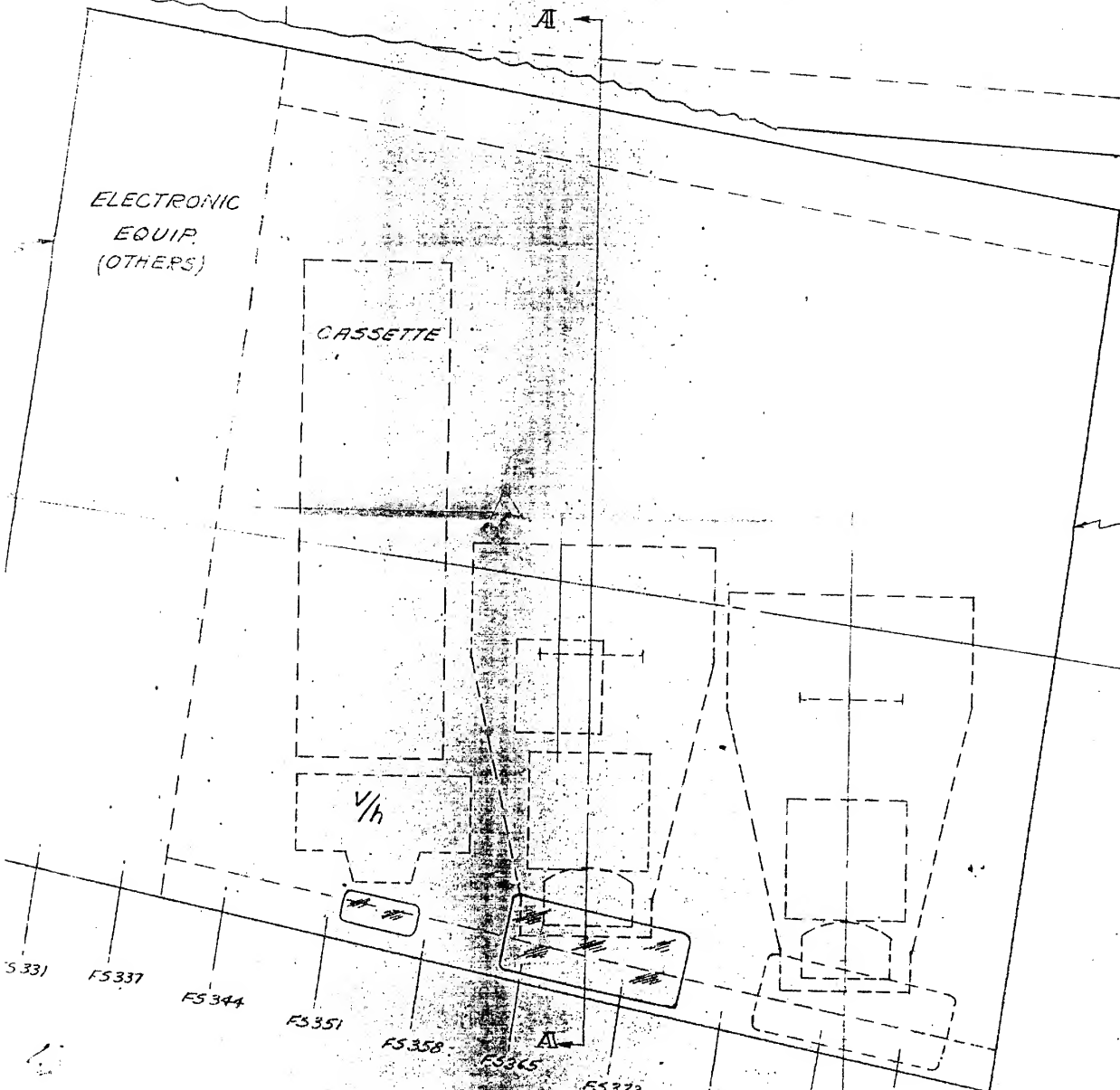
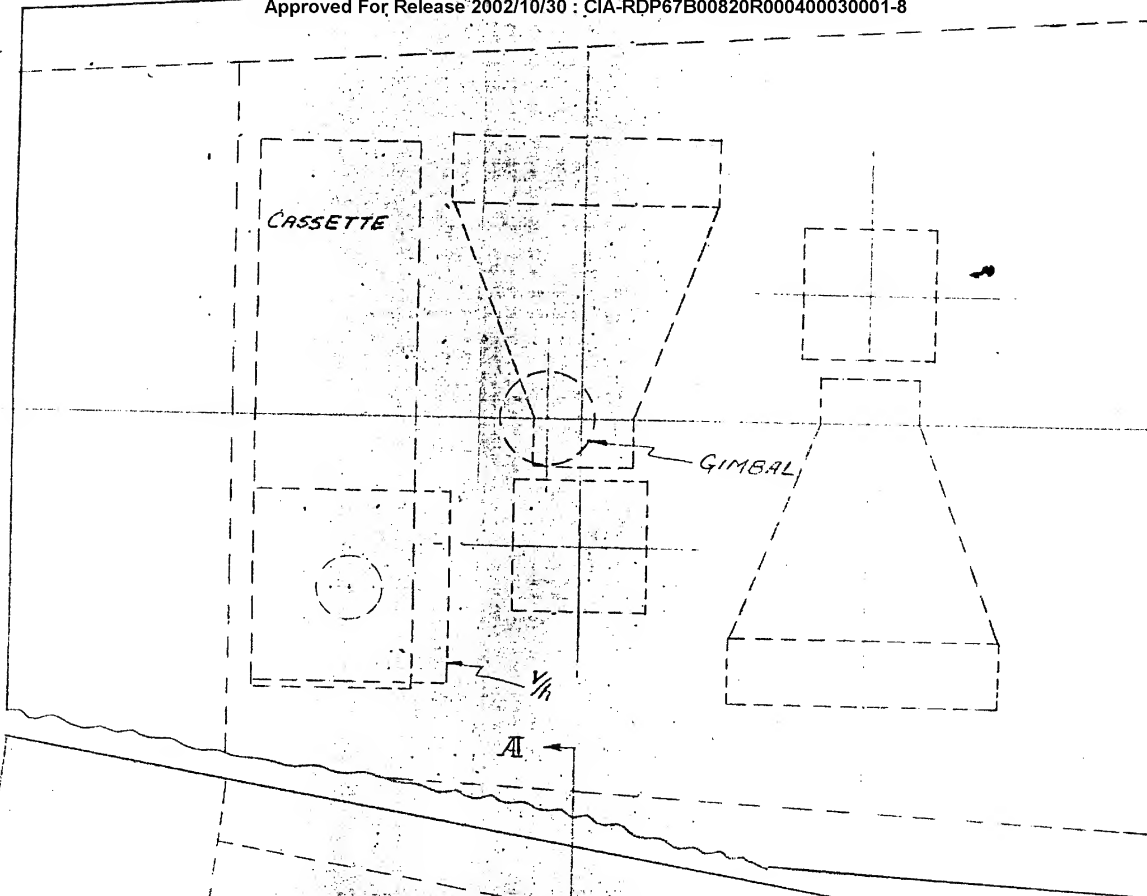
FIG 4

$\frac{1}{8}$  SCALE



FRONT VIEW

W



SIDE VIEW

SECTION 2

STATEMENT OF WORK

- Item 1 - Study and Preliminary Design
- Item 2 - Final Design
- Item 3 - One (1) Prototype System
- Item 4 - Five (5) Additional Systems
- Item 5 - Acceptance Tests
- Item 6 - Field Support Equipment
- Item 7 - Spare Parts
- Item 8 - Instruction Manuals

Attachment I

STATEMENT OF WORK

1. Study and Preliminary Design
  - 1.1 A study program will be performed as a continuation of the objectives designated under prior Contract No. OM 5400 and as outlined in Document No. 68 dated October 20, 1959. Primary objective of this program will be extensive study and evaluation of all feasible systems in an effort to determine the optimum system. Acceptance of the contractor's recommendation of the optimum system will constitute approval to proceed in the final design of the system configuration.
  - 1.2 Final design effort will proceed pending this approval. If written approval or disapproval is not received within fifteen (15) days after submission, approval will be considered as granted. In this case formal written approval must be furnished by the customer within forty-five (45) days after submission of the above recommendation.
  - 1.3 The effort described in paragraph 1.1 above has been completed with the submission of Section 1. of Document No. 119 and the Contractor's recommendation of the "T" system.
  - 1.4 Delivery - March 4, 1960
2. Final Design
  - 2.1 Design layout drawings of a prototype system will be prepared in accordance with the objectives approved under item 1, in sufficient detail to indicate the overall configuration of the system, and the critical dimensions for mounting and operation.



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or facilities have been continuously available to permit an average acceptance test rate of three (3) tests per week. Written final acceptance of each unit of item 4 will be furnished by the customer within seven (7) days after each units satisfactory acceptance test is completed.

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  - c. Stabilization Equipment
  - d. Film Transport Mechanism
  - e. Electronic Equipment

8.2 The General System Manual will be similar to those supplied under contract #HF-20-80. It shall present a general understanding of the overall system and its function. Half-tone line drawings and other necessary illustrations shall be included.

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Caging Mechanism

and directly related equipment.

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8.3.5 The Instruction Manual for the Electronic Systems shall cover the following:

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Data

V/H Sensor

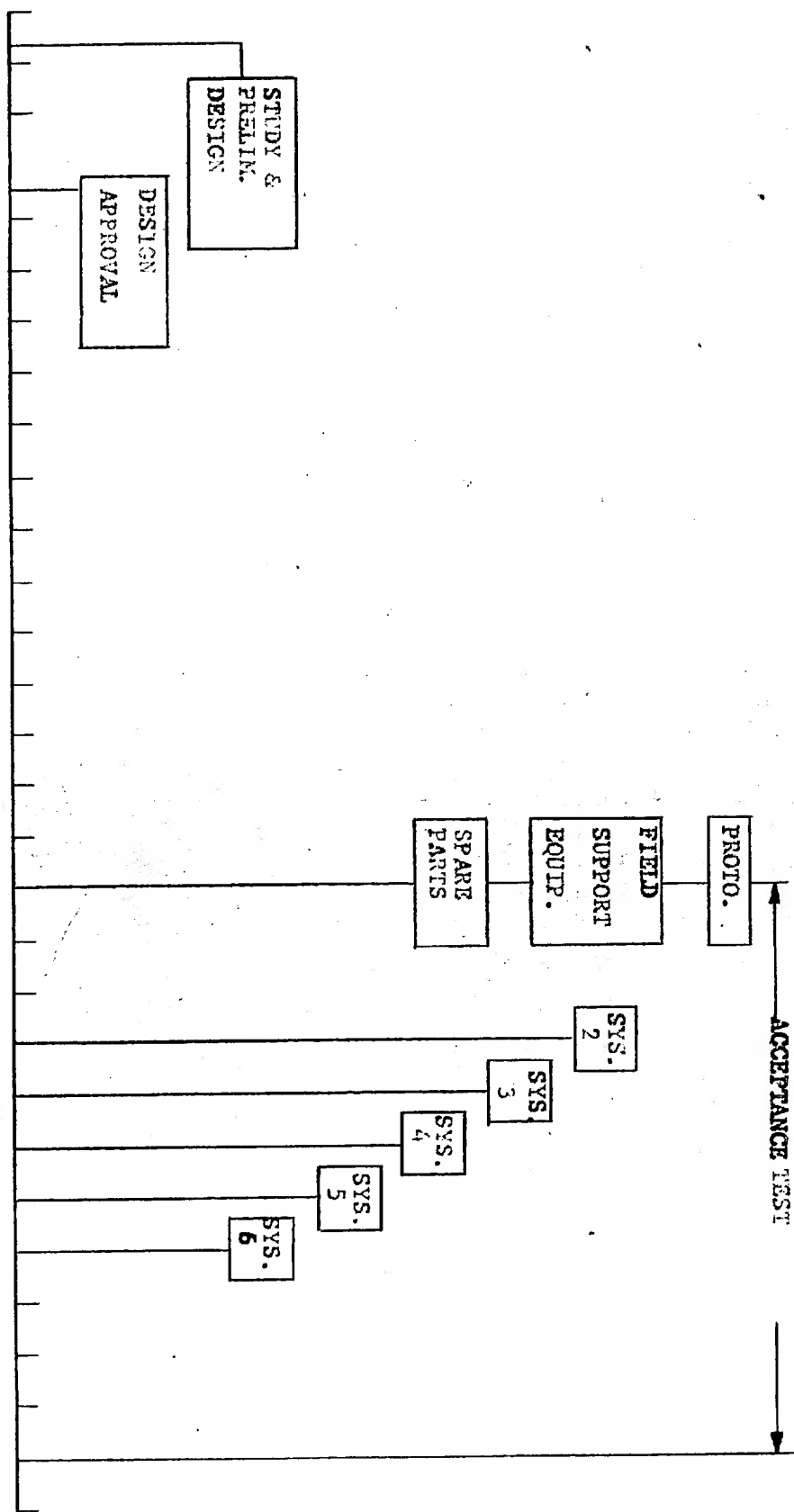
Exposure Control

Power Supply

and directly related electronic equipment.

- 8.4 Delivery of the General System Manual shall be three months after assembly of the first prototype instrument.
- 8.5 Delivery of the first preliminary Instruction Manuals shall be made at the time of shipment of the first prototype from the contractor's plant to the customer's test site.

Feb. 1, 1960  
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 Jan. 1, 1962  
 Feb.  
 Mar.  
 Apr.  
 May  
 June  
 July



DELIVERY SCHEDULE

SECTION 3

PROGRAM DESCRIPTION

Program Schedule

Prototype Flow Chart

Engineering Breakdown

Total Engineering

**FIRST  
SYSTEM**

Optical Design  
System Design  
Electronic Design  
Mechanical Design  
Detailing  
Purchasing  
Glass Procurement  
Optical Tooling  
Glass Manufacturing  
Mechanical Mfg.  
Assembly  
Test, Flight Test, &  
Rework

**FIELD  
SUPPORT  
EQUIPMENT**

Design  
Detailing  
Manufacturing  
Purchasing  
Assembly  
Test & Rework

**SYSTEM**

2 - 6

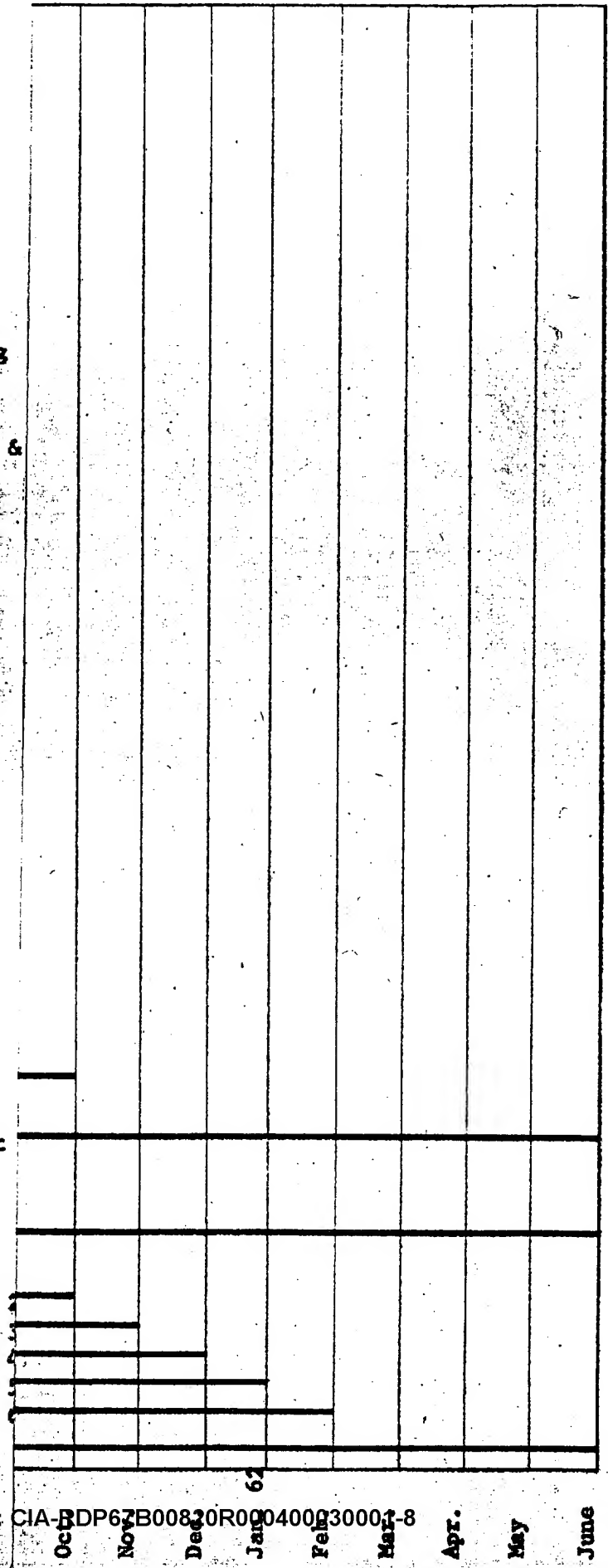
Glass Procurement  
Optical Tooling  
(Refinements)  
Glass Mfg. Sys 1  
3  
4  
5  
6

Spare Glass

Product Improvement

Purchasing  
Eng. Follow Up  
Mechanical Mfg.  
Assem. & Test Sys.

Flight Test



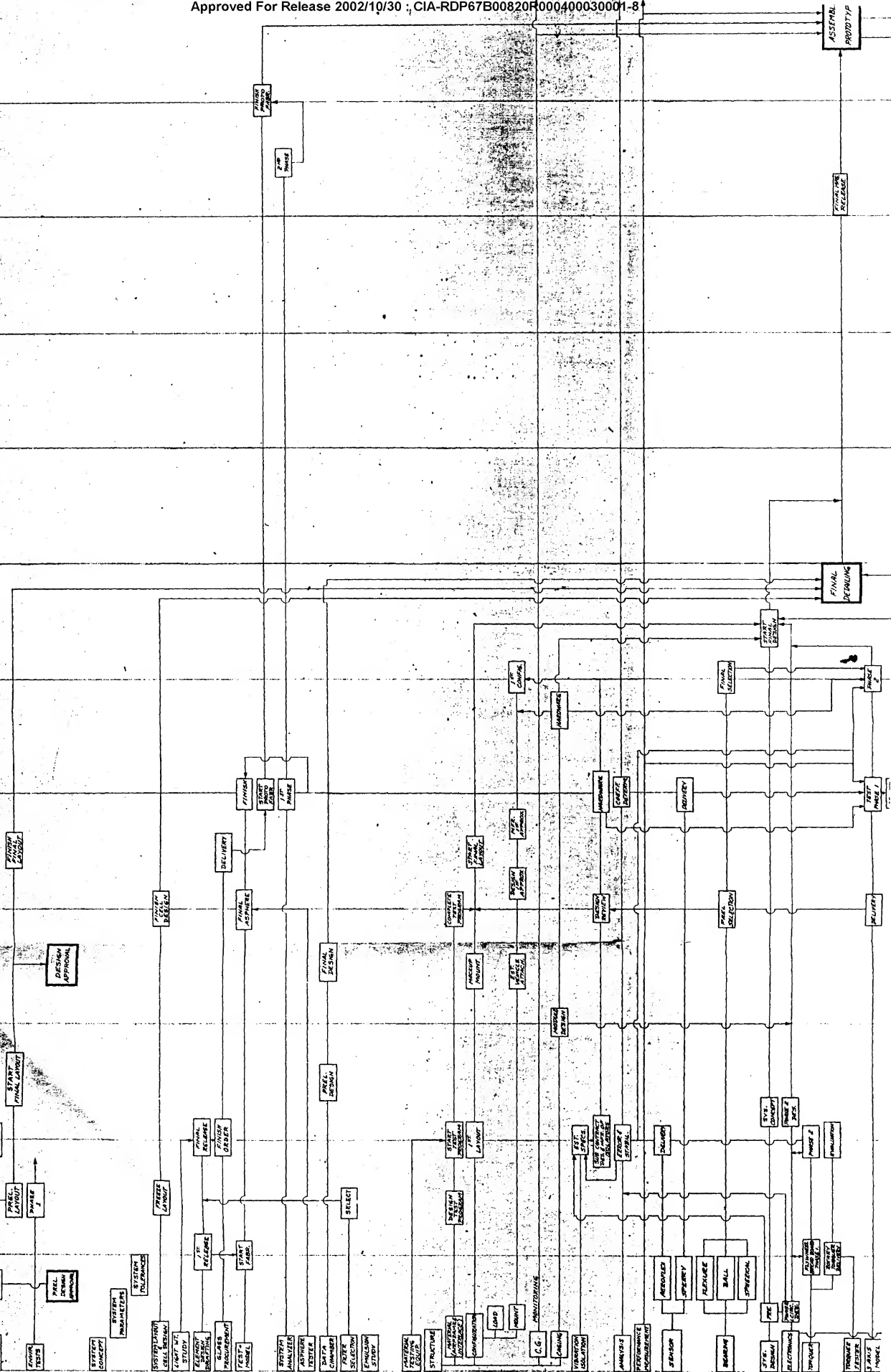


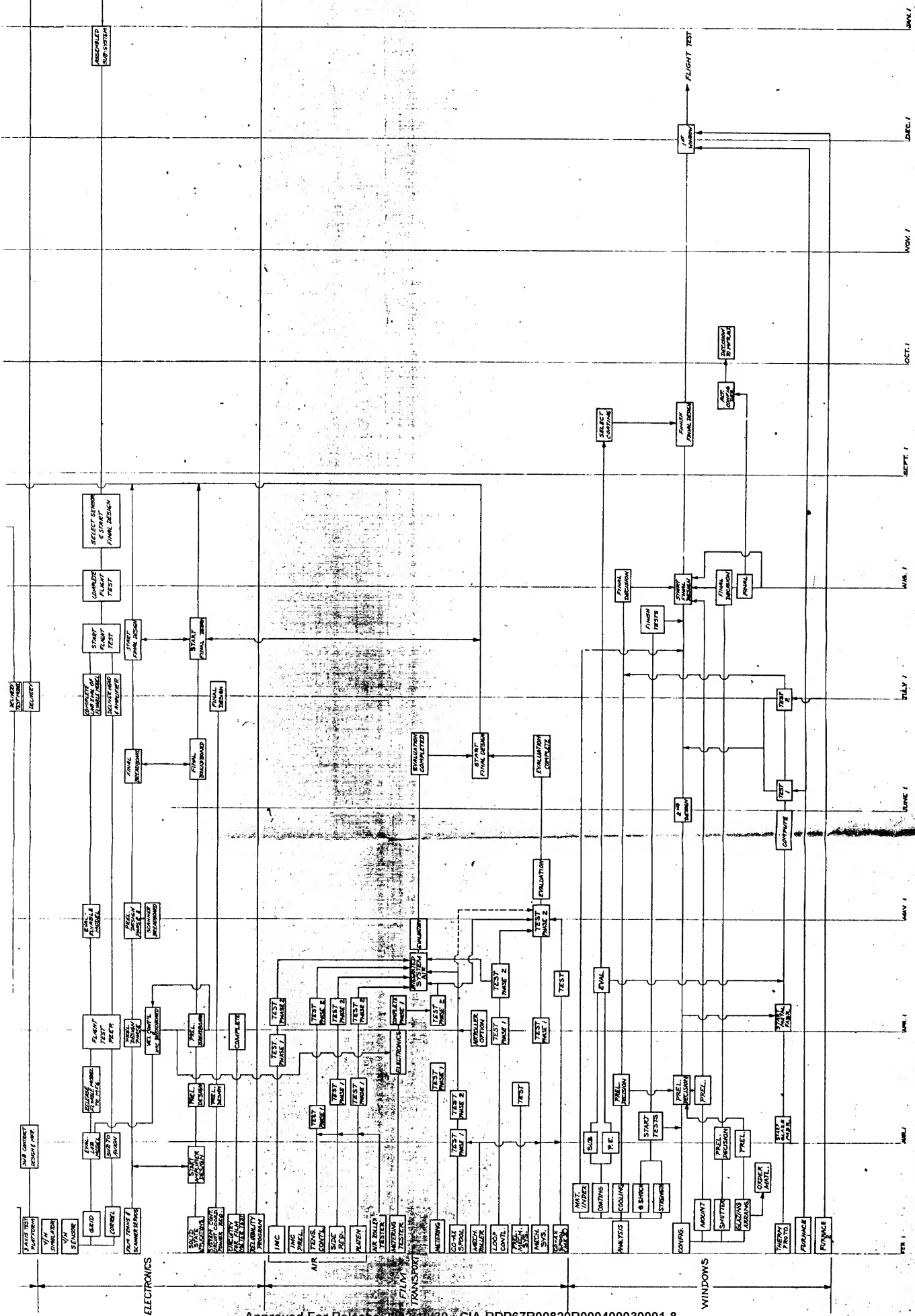
# PROTOTYPE FLOW CHART

SYSTEMS

OPTICAL  
PROTOTYPE

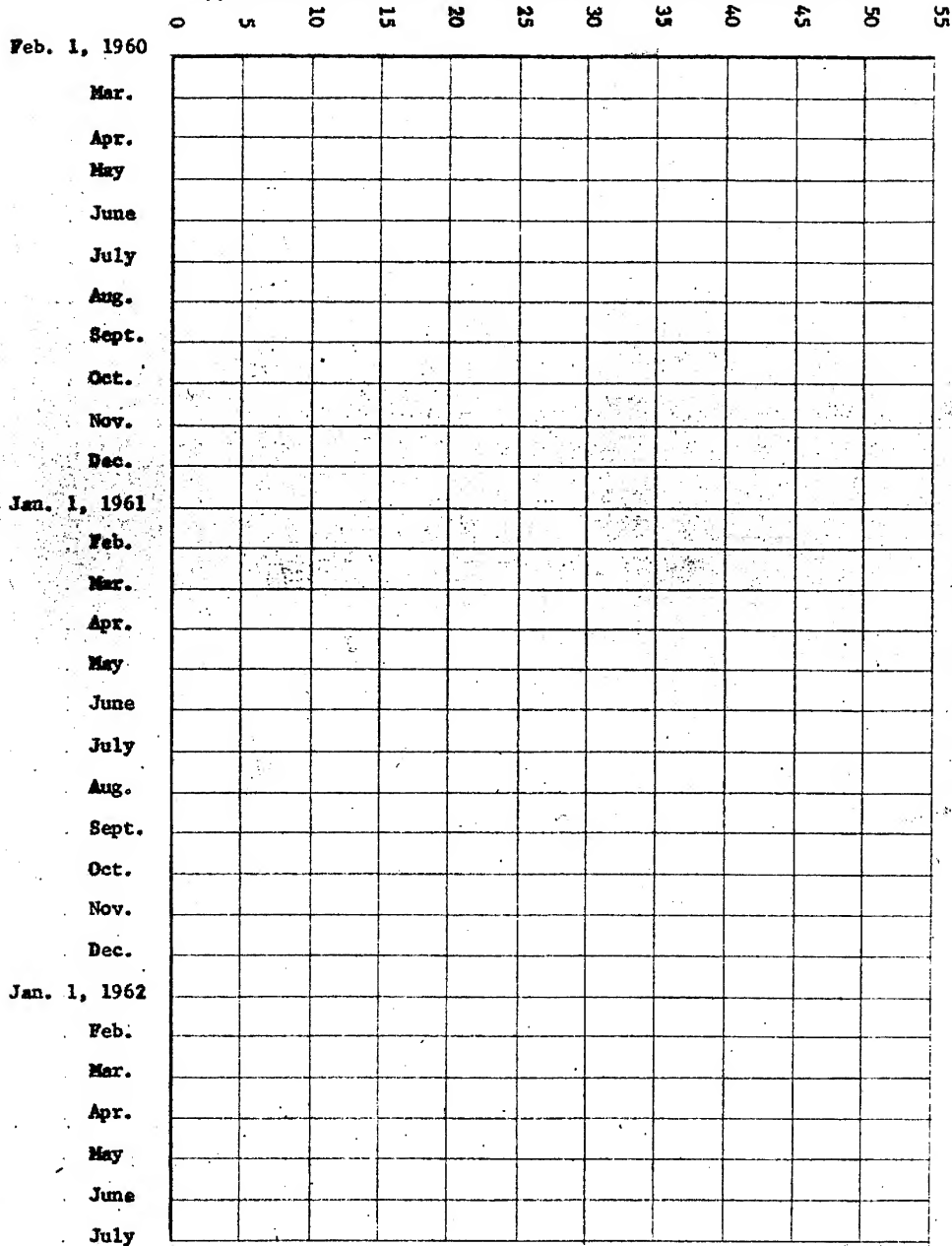
STABILIZATION





# NO. OF PEOPLE

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ENGINEERING BREAKDOWN AT SPECIAL FACILITY  
(Post Road)

NO. OF PEOPLE

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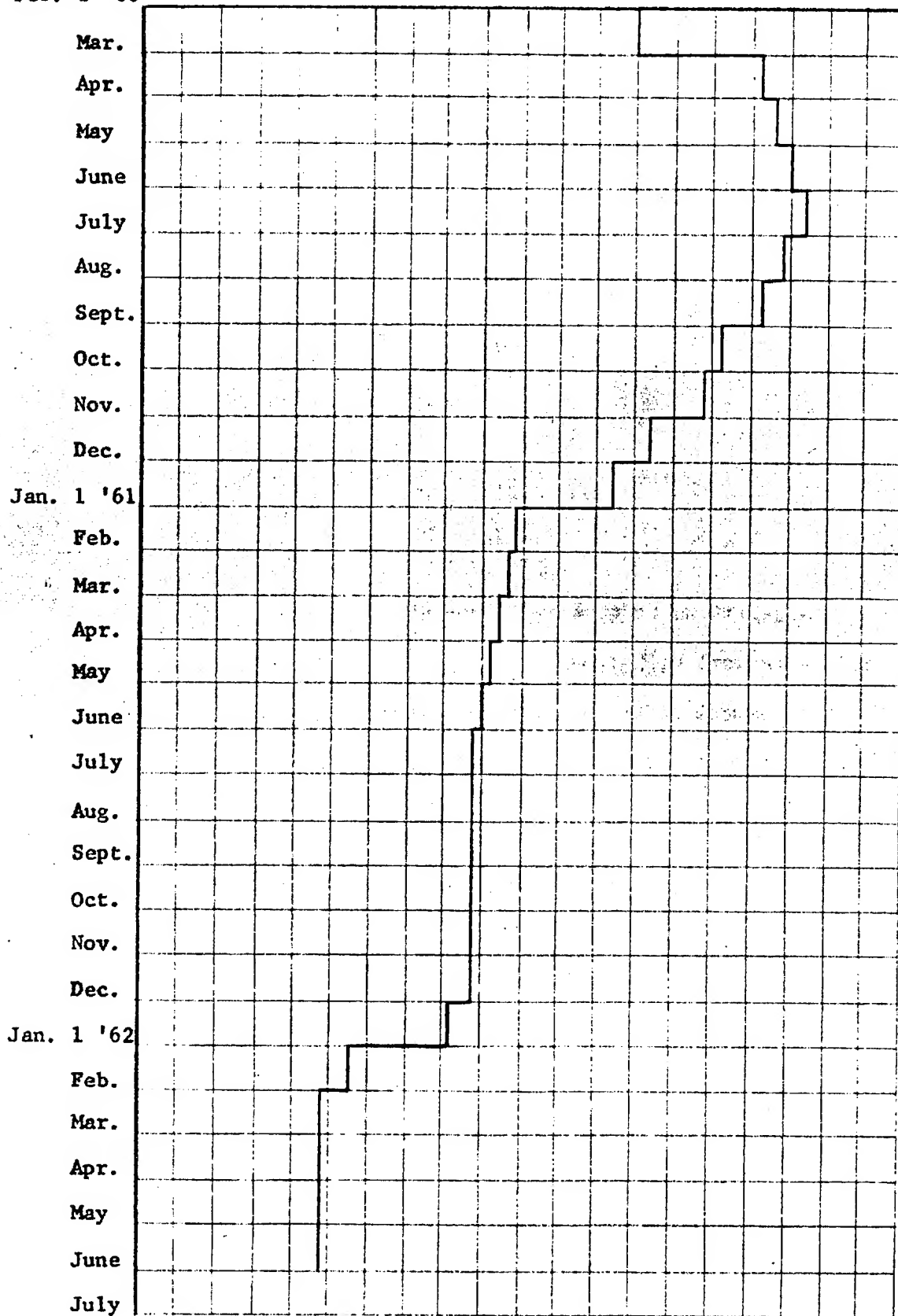
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| Apr.         |   |   |    |    |    |    |    |    |    |    |    |    |
| May          |   |   |    |    |    |    |    |    |    |    |    |    |
| June         |   |   |    |    |    |    |    |    |    |    |    |    |
| July         |   |   |    |    |    |    |    |    |    |    |    |    |
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| July         |   |   |    |    |    |    |    |    |    |    |    |    |
| Aug.         |   |   |    |    |    |    |    |    |    |    |    |    |
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| Mar.         |   |   |    |    |    |    |    |    |    |    |    |    |
| Apr.         |   |   |    |    |    |    |    |    |    |    |    |    |
| May          |   |   |    |    |    |    |    |    |    |    |    |    |
| June         |   |   |    |    |    |    |    |    |    |    |    |    |
| July         |   |   |    |    |    |    |    |    |    |    |    |    |

ENGINEERING BREAKDOWN AT SPECIAL FACILITY

(Post Road)

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Feb. 1 '60



TOTAL ENGINEERING

25X1A

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ATTACHMENT "B"

## FIELD SUPPORT EQUIPMENT FOR SIX (6) SYSTEMS

Collimator with six (6) large flats to permit observation of oblique positions.

Tools, meters, etc.

Elec.-mech. check-out consoles:

Configuration

Window

Hatch

Pilot control

Film viewing table and microscope

Film rewinds

Dollies, Lifts, Hoists, Stands

Desiccation Equipment

Power Cart

Cabinets, Benches, Vacuum Cleaner, Office Equipment

Special Clothing

Flight Test Instrumentation

Photographic Equipment and Supplies

Optical Test Apparatus

Strength Tester

Vacuum Tester

Cycle Tester

25X1A

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